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Third Edition

VIROLOGY

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TABLE 2-4. THE MAJOR FAMILIES OF ANIMAL VIRUSES (Continued)

RNA-Containing Viruses		
Hepadnaviridae		
<ul style="list-style-type: none"> • Enveloped icosahedral nucleocapsids • Diameter: 42 nm <p>Hepadnavirus genomes are the smallest human or animal virus genomes known (about 3 kilobase pairs). Their lipoprotein envelope (surface antigen, HBsAg) possesses an extraordinary tendency for self-association, forming spherical or rodlike particles (diameter 22 nm) that are often present in the sera of infected individuals in 10,000-fold excess over the 42 nm virions, also known as Dane particles. HBsAg possesses several epitopes, some of which are group-specific, while others are not only type-specific but subtype-specific; thus eight allelic subtypes of human HBV have been described. The epitopes on the core component (HBcAg) are partially group-specific. The replication of hepadnavirus DNA involves reverse transcription of RNA into DNA. Hepadnaviruses exhibit tissue tropism for hepatocytes. Persistent infections are common. Hepadnavirus DNA is capable of integrating into cellular DNA.</p>		
Hepatitis B virus (HBV)	Host Humans	Symptoms in humans Acute and chronic hepatitis; cirrhosis; hepatocellular carcinoma; immune complex disease; polyarteritis; glomerulonephritis; infantile papular acrodermatitis; aplastic anemia
Woodchuck hepatitis B virus (WHBV)	Eastern woodchuck	—
Ground squirrel hepatitis B virus (GSHBV)	Ground squirrel	—
Duck hepatitis B virus (DHBV)	Peking duck	—
Tree squirrel hepatitis B virus (TSHBV)	Tree squirrel	—
Parvoviridae		
<ul style="list-style-type: none"> • Naked icosahedral nucleocapsids • Diameter: 22 nm <p>Parvoviruses contain single-stranded DNA. Members of the genus <i>Parvovirus</i> encapsidate negative-stranded DNA preferentially (50–99%); but particles of members of the <i>Dependovirus</i> and <i>Densovirus</i> genera encapsidate plus- and minus-stranded DNA with equal efficiency. The replication of parvoviruses tends to be dependent on helper functions which for members of the genus <i>Parvovirus</i> are supplied by rapidly growing (not resting) cells, which explains why they are often found associated with tumors and possess oncolytic properties; and for members of the genus <i>Dependovirus</i> by coinfection with adenoviruses, herpesviruses, or poxviruses. The essential function that must be supplied is most probably activation of the transcription of the parvovirus genome. Members of the genus <i>Parvovirus</i> are 70–90% related genetically; those of the genus <i>Dependovirus</i> 60–70%. The rodent parvoviruses are unrelated immunologically to FPLV, CPV, and MEV, which are themselves closely related immunologically. Parvoviruses generally have narrow host ranges. Parvoviruses can establish latent infections; cells latently infected possess parvovirus genomes integrated into their DNA, but are not transformed and exhibit no discernible change in phenotype.</p>		
Genus <i>Parvovirus</i>	Host	Symptoms in humans
Parvovirus-like agent (PVLA) Strain B19	Humans	Erythemia infectiosum (fifth disease); linked to aplastic crisis in hemolytic anemia/sickle cell anemia
Lu-111	Humans	No known disease
Feline panleukopenia virus (FPLV)	Cat	—
Canine parvovirus (CPV)	Dog	—
Mink enteritis virus (MEV)	Mink	—
Hamster osteolytic viruses (H-1, H-3, x-14)	Rat, hamster	—
Kilham rat virus (KRV)	Rat	—
Minute virus of mice (MVM)	Mouse	—
Aleutian mink disease virus	Mink	—
Porcine parvovirus	Pig	—
Bovine parvovirus	Cattle	—
Genus <i>Dependovirus</i>		
Adeno-associated virus (AAV)	Humans	Antibodies very prevalent; no known symptoms
Serotypes 1,2,3,5		
Serotype 4	Monkeys	—
Genus <i>Densovirus</i>		
Densonucleosis viruses	Insects	—
RNA-containing Viruses		
Picornaviridae		
<ul style="list-style-type: none"> • Naked icosahedral nucleocapsids • Diameter: 25–30 nm <p>Picornaviruses comprise a large number of virus strains pathogenic for many animals species. They are subdivided into four genera: <i>Enterovirus</i> and <i>Cardiovirus</i>, whose members are acid-stable, and <i>Rhinovirus</i> and <i>Aphthovirus</i>, whose members are acid-labile.</p>		
Genus <i>Enterovirus</i>	Host	Symptoms in humans
Human enteroviruses		
Poliovirus	Humans, monkey	Poliomyelitis
2 coxsackieviruses		

CHAPTER 2. THE STRUCTURE, COMPONENTS, AND CLASSIFICATION OF VIRUSES

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TABLE 2-4. THE MAJOR FAMILIES OF ANIMAL VIRUSES (Continued)

RNA-Containing Viruses		
Retroviridae (RNA tumor viruses)		
	<ul style="list-style-type: none"> • Enveloped particles containing a coiled nucleocapsid within a probably icosahedral core shell • Diameter: about 100 nm <p>The retrovirus family comprises a large group of viruses characterized by a common morphology, a genome that consists of two identical plus-stranded RNA molecules, and possession of reverse transcriptase. There are three subfamilies. The first, the <i>Oncovirinae</i>, comprises the C-, B-, and D-type retroviruses. These viruses are oncogenic; they cause leukemias, lymphomas, mammary and neuronal tumors. The second subfamily, the <i>Lentivirinae</i>, comprises the <i>Visna</i> group of viruses. They resemble the <i>Oncovirinae</i> with respect to morphology, nature of the genome and possession of a reverse transcriptase, but do not transform cells. The third subfamily, the <i>Spumavirinae</i>, comprises the foamy viruses, which are found in spontaneously degenerating kidney (and other) cell cultures, causing the formation of multinucleated vacuolated giant cells that have a highly characteristic appearance.</p>	
Subfamily	Host	Symptoms in humans
<i>Oncovirinae</i>		
Genus <i>Oncornavirus C</i>		
Subgenus <i>Oncornavirus C avian</i>		
Endogenous leukemia/leukosis viruses (RAV-0, RAV-1, RAV-2, etc.)	Chicken	—
Nondefective avian sarcoma viruses (ASV)	Chicken	—
Defective sarcoma/acute leukemia viruses	Chicken	—
Numerous viruses including		
Fujinami sarcoma virus (FSV)		
Avian myeloblastosis virus (AMV)		
Avian erythroblastosis virus (AEV)		
Avian myelocytomatosis virus (MC29)		
Reticuloendotheliosis virus (REV)	Chicken, duck	—
Subgenus <i>Oncornavirus C mammalian</i>		
Endogenous leukemia viruses, numerous strains	Mammals	—
Defective sarcoma/acute leukemia viruses	Rodents	—
Numerous strains including		
Abelson murine leukemia virus		
Murine sarcoma viruses (Harvey, Kirsten, Moloney, Rasheed)		
Feline sarcoma viruses	Cats	—
(Snyder, Theilen, Gardner-Arnstein, McDonough, and other strains)		
Simian sarcoma virus	Monkeys	—
Human T-cell leukemia/lymphoma virus	Humans	—
HTLV-I		Isolated from patients with cutaneous T-cell lymphomas and adult T-cell leukemia
HTLV-II		Isolated from a T-cell line established from a patient with a variant of hairy cell leukemia
Genus <i>Oncornavirus B</i>		
Mouse mammary tumor virus	Mouse	—
(Bittner virus) (milk factor)		
Viruses of guinea pigs, baboons, and other mammals	Mammals	—
Genus <i>Oncornavirus D</i>		
Mason-Pfizer monkey virus (MPMV)	Rhesus monkey	—
Viruses from primates	Primates	?
Guinea pig virus	Guinea pig	—
<i>Lentivirinae</i>		
<i>Visna</i>	Sheep	—
<i>Maedi</i>	Sheep	—
Progressive pneumonia virus	Mice	—
Equine infectious anemia virus	Horse	—
Human immunodeficiency virus (HIV)	Humans	—
also known as human T-cell leukemia virus III (HTLV-III) or lymphadenopathy associated virus (LAV)		Acquired immune deficiency syndrome (AIDS)
<i>Spumavirinae</i>		
Human foamy virus	Human cells	—
Simian foamy viruses	Monkey kidney cells	—
9 serotypes		
Canine foamy virus	Dog kidney cells	—
Bovine syncytial virus	Bovine kidney cells	—
Feline syncytial virus	Feline cells	—
Hamster syncytial virus	Hamster cells	—

(continued)